

To: Laidlaw, Tina[Laidlaw.Tina@epa.gov]
From: Blend, Jeff
Sent: Thur 2/5/2015 3:37:55 PM
Subject: Emailing: DEQ S_W Demonstrationw_Oct_2011 (RO in all Flow NO CWNS)_rev10_12_11.xlsx
DEQ S_W Demonstrationw_Oct_2011 (RO in all Flow NO CWNS)_rev10_12_11.xlsx

Your message is ready to be sent with the following file or link attachments:

DEQ S_W Demonstrationw_Oct_2011 (RO in all Flow NO CWNS)_rev10_12_11.xlsx

Note: To protect against computer viruses, e-mail programs may prevent sending or receiving certain types of file attachments. Check your e-mail security settings to determine how attachments are handled.

Community	Current Treatment Technology	Would the criteria apply? Or is there dilution capability?	Design Flow (MGD)	Actual Flow (MGD)	Community Population (Census 2010)	Number of Households (American Community Survey 2005-2009)
Kalispell	BNR (modified Johannesburg); 3.1 to 5.4 MGD; avg. .12 mg/l TP; 10 mg/l TN.	Yes. EOP; Ashley Creek	5.4	3.10	19,927	7,705
Bozeman	some BNR now; 5-stage Barrdenpho; new plant will be BNR (1 mg/l TP; 3 mg/l TN starting in 2011); current 5.8 MGD; increasing to 13.9 mgd	Yes. Also Gallatin TMDL in the works.	13.8	5.80	37,280	14,614
Helena	BNR; 3 mg/l TP; 10 mg/l TN; design capacity of 5.4; current discharge ~3.0 MGD	Yes. WLA set in TMDL based on numeric criteria.	5.4	3.00	28,190	12,337
Butte	Current technology is activated sludge (TN of 18.5 mg/l; TP of 2.11 mg/l); under Order to Construct to membrane BNR; current design is 8.5 MGD; talking about lowering to 6.1 MGD. Sewer Fee based on DEQ estimates. Included in current fee is \$27 million upgrade in new capital costs and \$1.125 million in O&M costs which would bring them to 5 TN and 0.1 TP	Yes. EOP.	8.5	4.00	33,525	14,041
Billings	2ndary treatment; Design flow of 26 MGD (avg.) and 40 MGD max.	Yes. Discharge into the Yellowstone River.	26	26	104,170	41,841
Missoula	advanced secondary treatment facility with biological nutrient removal and ultraviolet disinfection; meets Clark Fork criteria w/ mixing zone. 8.2 mg/l TN; 0.16 -0.4 mg/l TP; get a mixing zone, meeting criteria currently. BNR. Design flow = 12 MGD ; actual flow = 9 MGD. (designed for 10 and 1). (HDR)	Yes. With mixing zone. Currently meeting criteria after mixing zone.	12	9	66,788	27,553
Great Falls	conventional 2ndary activated sludge (max 21-MGD; avg. 10 MGD)	Yes. Missouri River	26	26	58,505	23,998

Livingston	discharges into the Yellowstone; permit renewed in 2010; mechanical plant w/ 2 primary clarifiers, 3 rotating biological contactors, UV, installing co-composting. DMR shows 11 mg/l TN average (20 mg/l for May) and 2 mg/l TP (3 mg/l for May).	Yes. Discharge into the Yellowstone River.	5	2	7,044	3,188
Miles City	2ndary treatment plus oxidation ditch. 2011 permit. Algae plant study to remove nutrients. Extended aeration system w/2 oxidation ditches w/rotating brush aerators; 2 clarifiers and chlorine basin. TN avg of 23.5 mg/l; TP avg. 3.6 mg/l.	Yes. Discharge into the Yellowstone River.	3.7	2	8,410	3,518
Hamilton	BNR facility. t w/ extended aeration system. Oxidation ditch w/ rotating brush aerators. 3 clarifiers. Upgraded in 2010. TN avg. 5.5 mg/l; TP avg. 5 mg/l.	Yes	1.98	0.68	4,348	2,092
Lewistown	BNR plant. Focus on TP removal. 0.8 mg/l TP; 3-4 mg/l TN.	Yes	2.5	1.5	5,901	2,727
Havre	Discharges into the Milk River. Permit renewed in 2011. Activated sludge facility with effluent chlorination. 2006-2010 data showed avg. TP of 3.4 (TN not required). 2011 DMR showed TN of 19.4 mg; Tp of 1.3 mg/l.	Yes	1.8	1.38	9,310	3,709
Columbia Falls	Newer plant. Designed to achieve 8 mg/l TN	Yes	0.766	0.37	4,688	1,621
Manhattan	Discharges into Diva Ditch. Permit renewed in 2010. Denitrification with fixed film suspended growth system, clarifiers and aerobic sludge digestion, UV. DMR data from winter quarter shows 11 mg/l TN and 1 mg/l TP. 2008-2010 showed avg. TN of 14 mg/l TN and 4 mg/l TP.	Yes	0.6	0.4	1,520	523
Lolo	No steps towards nutrient removal. For Lolo, TN is generally less than 30 mg/l and TP less than 7. Generally heaving loadings for Lolo. Sewer rates--Lolo \$30.25-ish/mo - (RSID) based on property values	Yes	0.34	0.38	3,892	1,060

Stevensville	Stevensville is generally a little better with TN generally below 20 and TP less than 4.	Yes	0.3	0.29	1,809	795
Philipsburg	lagoon to simple mechanical system - ref. Gary Swanson, consulting engineer- 15TN, 2TP	Yes.	0.2	0.2	820	399
Cut Bank	Lagoon.	Yes	0.643	0.643	2,869	1,290
Deer Lodge	Moving from an existing lagoon to mechanical plant with land application. Ref: planning document--To get to variance only. Because this would be a land application system, so theoretically, the N and P would be zero to the Clark Fork	Yes	3.3	1.06	3,111	1,522
Glendive	domestic WW lagoon; 3 cell facultative; current O&M costs are <\$; 8-10 capital costs for new plant. O&M increase of ~\$300,000. new avg. 1.15 MGD; PER completed to upgrade to mechanical SBR or BNR plant.	Yes	1.3	0.6	4935	1883
Redlodge	Lagoon.	Yes	1.2	0.65	2125	1055
Big Fork	Lagoon.	Yes	0.5	0.3	4270	1708
Highwood	Lagoon.	Yes	0.026	0.015	176	53
Circle	Lagoon.	Yes	0.16	0.065	615	234

NOTE: Operation costs include energy and chemical costs only and do not include labor and maintenance cost. As such, these numbers are on the low side.

NOTE: The numbers are intended to provide ROUGH ESTIMATES for discussion purposes and do not reflect the site-specific conditions at each plant.

NOTE: Capital costs were assumed to cover a 20-year bond with 5% interest (used 0.0802 conversion factor)

NOTE: MHI is based on data from Montana CEIC based on 2010 estimates.

	Indicates rough estimates; need to verify
	Big Fork number of household based on population divided by 2.5

Median Household Income (2010) - American Community Survey.	Current average household sewer bill per year (2008 / 2011)	Current average sewer fee as % of MHI	Notes	Capital cost (million dollars) to meet the numeric nutrient criteria (WERF)	Annual Capital cost to meet the numeric nutrient criteria (L4 WERF)	Annual Operations costs to meet the numeric nutrient criteria L4WERF	Annual Capital and Operations cost (\$)
\$39,953.00	\$361.68	0.91%	Sewer rates obtained from City in 2011. Plant ~WERF Level 2.	84.24	\$6,756,048	\$1,782,965	\$8,539,013
\$41,661.00	\$372.00	0.89%	Sewer rates obtained from City in 2011. Plant ~WERF Level 2. Really Level 3 for TN and 1 for TP	215.28	\$17,265,456	\$3,335,870	\$20,601,326
\$47,152.00	\$277.80	0.59%	Sewer rates obtained from City in 2011. Plant ~ WERF Level 1.	102.60	\$8,228,520	\$1,834,950	\$10,063,470
\$37,335.00	\$360.00	0.96%	Sewer Fee based on DEQ estimates. While current monthly fee is \$13.50, the \$27 million upgrade in new capital costs plus \$1.125 million in additional O&M costs which would bring them to 5 TN and 0.1 TP (WERF 3) would raise rates to \$30 per month	118.15	\$9,475,630	\$1,877,200	\$11,352,830
\$45,004.00	\$218.28	0.49%	The numbers for Billings and Great Falls (treatment levels, treatment costs etc.) were obtained from HDR.	312.50	\$38,095,000	\$15,902,900	\$53,997,900
\$34,319.00	\$152.14	0.44%	Sewer rates obtained from city. 2011 values.	88.80	\$7,121,760	\$2,614,050	\$9,735,810
\$40,718.00	\$187.20	0.46%	At WERF 1. The numbers for Billings and Great Falls (population, treatment levels, etc.) were obtained from HDR.	312.50	\$38,095,000	\$15,902,900	\$53,997,900

\$35,689.00	\$600.00	1.68%	Assume WERF Tier 1	95.00	\$7,619,000	\$1,223,300	\$8,842,300
\$37,554.00	\$236.10	0.63%	Assume WERF Tier 1	70.30	\$5,638,060	\$1,223,300	\$6,861,360
\$25,161.00	\$276.00	1.10%	Assume WERF 2 (since TN gets to WERF 3 and TP WERF 1)	24.75	\$3,017,124	\$423,602	\$3,440,726
\$31,729.00	\$387.60	1.22%	Assume WERF 3 based on current treatment levels	18.50	\$2,786,950	\$691,950	\$3,478,900
\$43,577	\$240.00	0.55%	Assumed WERF Level 1 and 5,000 gallons usage. Rate is \$9.15 flat plus \$2.15 per 1,000 gallons	\$34.20	\$2,742,840	\$844,077	\$3,586,917
\$38,750	\$532.20	1.37%	Upgrade to RO	\$10.65	\$853,921	\$938,600	\$1,792,521
\$50,729	\$362.40	0.71%	Assumed WERF Level 2. Correct? Paul.	\$9.36	\$750,672	\$92,024	\$842,696
\$46,442	\$363.00	0.78%	Level 1.	\$6.46	\$518,092	\$232,427	\$750,519

\$33,776	\$535.08	1.58%		\$3.75	\$300,750	\$125,512	\$426,262
\$31,375.00	\$200.00	0.64%	Assume WERF 1	\$3.80	\$ 304,760.00	561,650.00	\$866,410.00
\$44,833	\$138.48	0.31%	4000 gallons. Base rate \$9.48 at 3000 gallons plus \$2.06 for next 1,000 gallons	\$14.02	\$ 1,124,195.48	228,290.40	\$1,352,485.88
\$40,320	\$409.56	1.02%	Moving from an existing lagoon to mechanical plant with land application. Ref: planning document--To get to variance only. Because this would be a land application system, so theoretically, the N and P would be zero to the Clark Fork	\$71.94	\$1,261,145.00	\$555,493.00	\$1,816,638.00
\$42,821	\$213.96	0.50%		\$36.79	\$2,950,558.00	\$391,740.00	\$3,342,298.00
\$50,123	305.28	0.61%	Sewer Fee and MHI based on DEQ estimates. DEQ MHI value less than the 2010 USDA county data.	\$26.16	\$2,098,032.00	\$308,132.50	\$2,406,164.50
\$44,398	580.36	1.31%		\$10.90	\$874,180.00	\$142,215.00	\$1,016,395.00
\$62,614	600.00	0.96%		\$0.57	\$45,457.36	\$7,110.75	\$52,568.11
\$29,000	259.56	0.90%		\$3.49	\$279,737.60	\$30,813.25	\$310,550.85

Annual Additional Cost per Household (increase in sewer rate)	Predicted average household sewer fee to meet criteria	Expected % MHI to Meet Base Numeric Nutrient Criteria (plus current wastewater fees)	Scenario A	Scenario B	Percent increase in Wastewater bill		
\$1,108	\$1,470	3.68	4.73	4.01	306%		
\$1,410	\$1,782	4.28	5.64	4.70	379%		
\$816	\$1,094	2.32	3.00	2.53	294%		
\$809	\$1,169	3.13	4.00	3.40	225%		
\$1,291	\$1,509	3.35	4.32	3.66	591%		
\$353	\$505	1.47	1.83	1.59	232%		
\$2,250	\$2,437	5.99	7.86	6.57	1202%		

\$2,774	\$3,374	9.45	12.67	10.46	462%
\$1,950	\$2,186	5.82	7.87	6.46	826%
\$1,645	\$1,921	7.63	10.39	8.49	596%
\$1,276	\$1,663	5.24	6.79	5.73	329%
\$967	\$1,207	2.77	3.58	3.02	403%
\$1,106	\$1,638	4.23	4.88	4.43	208%
\$1,611	\$1,974	3.89	5.25	4.32	445%
\$708	\$1,071	2.31	2.81	2.46	195%

265-6719 - City Office

WERF

Level	Description	Capital Cost (\$/gpd)	Operations (\$1/ MG/day Treated)
Level 1	No N and P removal	9.3	250
Level 2	1 mg/l TP; 8 mg/l TN	12.7	350
Level 3	0.1-0.3 mg/l TP; 4-8 mg/l TN	14.4	640
Level 4	<0.1 mg/l TP; 3 mg/l TN	15.3	880
100% RO	<0.01 mg/l TP; 1 mg/l TN	28.3	1860

Costs to Meet Criteria	Capital Cost(\$million/MGD)	Design Flow	Facility Upgrade Capital Costs (\$million)	Annualized Capital Costs (Assumed 20-yr bond & 5% interest; \$million/year)
Kalispell	15.6	5.4	\$84.24	\$6.76
Bozeman	15.6	13.8	\$215.28	\$17.27
Helena	19	5.4	\$102.60	\$8.23
Butte	13.9	8.5	\$118.15	\$9.48
Billings	19	25	\$475.00	\$38.10
Missoula	7.4	12	\$88.80	\$7.12
Great Falls	19	25	\$475.00	\$38.10
Livingston	19	5	\$95.00	\$7.62
Miles City	19	3.7	\$70.30	\$5.64
Hamilton	19	1.98	\$37.62	\$3.02
Lewistown	13.9	2.5	\$34.75	\$2.79
Havre	19	1.8	\$34.20	\$2.74
Columbia Falls	13.9	0.766	\$10.65	\$0.85
Manhattan	15.6	0.6	\$9.36	\$0.75
Lolo	19	0.34	\$6.46	\$0.52
Stephensville	12.5	0.3	\$3.75	\$0.30
Philipsburg	19	0.2	\$3.80	\$0.30
Cut Bank	21.8	0.643	\$14.02	\$1.12
Deer Lodge	21.8	3.3	\$71.94	\$5.77

	Glendive	28.3	1.3	\$36.79	\$2.95
	Red Lodge	21.8	1.2	\$26.16	\$2.10
	Big Fork	21.8	0.5	\$10.90	\$0.87
	Highwood	21.8	0.026	\$0.57	\$0.05
	Circle	21.8	0.16	\$3.49	\$0.28

Annualization Factor

0.0802

20 years, 5% rate	0.08024
20 years, 7% rate	0.09439

Annualized Capital Costs (Assumed 20-yr bond & 5% interest; \$million/year)	Annualized Capital Costs + UNFUNDED projects (Assumed 20-yr bond & 5% interest; \$million/year)	Operations (\$1/ MGD/day Treated)	Operations Costs (\$/ year/ 1 MGD)	Actual Flow	Facility Upgrade Operations Costs (annual) based on Facility MGD
\$6,756,048.00	\$8,815,277.56	1510	551,150.00	3.10	1,708,565.00
\$17,265,456.00	\$27,065,539.11	1510	551,150.00	5.80	3,196,670.00
\$8,228,520.00	\$9,284,486.77	1610	587,650.00	3.00	1,762,950.00
\$9,475,630.00	\$9,888,889.85	1220	445,300.00	4.00	1,781,200.00
\$38,095,000.00	\$41,497,567.61	1610	587,650.00	26.00	15,278,900.00
\$7,121,760.00	\$8,560,301.30	1220	445,300.00	9.00	4,007,700.00
\$38,095,000.00	\$39,584,480.42	1610	587,650.00	26	15,278,900.00
\$7,619,000.00	\$8,420,701.58	1610	587,650.00	2.00	1,175,300.00
\$5,638,060.00	\$5,638,060.00	1610	587,650.00	2.00	1,175,300.00
\$3,017,124.00	\$3,552,780.04	1610	587,650.00	0.68	399,602.00
\$2,786,950.00	\$3,381,497.94	1220	445,300.00	1.50	667,950.00
\$2,742,840.00	\$3,223,771.17	1610	587,650.00	1.38	810,957.00
\$853,921.48	\$1,015,474.60	1220	445,300.00	2.00	890,600.00
\$750,672.00	\$957,885.70	1510	551,150.00	0.16	88,184.00
\$518,092.00	\$1,395,898.48	1610	587,650.00	0.38	223,307.00
\$300,750.00	\$507,963.70	1120	408,800.00	0.29	118,552.00
\$304,760.00	\$304,760.00	1610	587,650.00	1.00	587,650.00
\$1,124,195.48	\$1,178,825.15	1120	408,800.00	0.64	262,858.40
\$5,769,588.00	\$6,298,636.52	1370	500,050.00	1.06	530,053.00

\$2,950,558.00	\$3,088,079.83	1860	628,900.00	0.6	377,340.00
\$2,098,032.00	\$2,098,032.00	1370	450,050.00	0.65	292,532.50
\$874,180.00	\$874,180.00	1370	450,050.00	0.30	135,015.00
\$45,457.36	\$45,457.36	1370	450,050.00	0.015	6,750.75
\$279,737.60	\$439,990.59	1370	450,050.00	0.065	29,253.25

Membrane Replacement Cost (\$24,000 /yr/1 MGD)*Actual Flow	Total Operations costs including membrane replacement	Total Operations costs including membrane replacement + Labor Low (15%)	Total Operations costs including membrane replacement + Labor Hi (48%)
74,400.00	1,782,965.00	\$2,796,372.20	\$5,025,868.04
139,200.00	3,335,870.00	\$5,925,688.40	\$11,623,288.88
72,000.00	1,834,950.00	\$3,069,228.00	\$5,784,639.60
96,000.00	1,877,200.00	\$3,298,544.50	\$6,425,502.40
624,000.00	15,902,900.00	\$21,617,150.00	\$34,188,500.00
216,000.00	2,614,050.00	\$3,682,314.00	\$6,032,494.80
624,000.00	\$15,902,900.00	\$21,617,150.00	\$34,188,500.00
48,000.00	\$1,223,300.00	\$2,366,150.00	\$4,880,420.00
48,000.00	\$1,223,300.00	\$2,069,009.00	\$3,929,568.80
24,000.00	423,602.00	\$876,170.60	\$1,871,821.52
24,000.00	691,950.00	\$1,109,992.50	\$2,029,686.00
33,120.00	\$844,077.00	\$1,255,503.00	\$2,160,640.20
48,000.00	\$938,600.00	\$1,066,688.22	\$1,348,482.31
3,840.00	\$92,024.00	\$204,624.80	\$452,346.56
9,120.00	\$232,427.00	\$310,140.80	\$481,111.16
6,960.00	\$125,512.00	\$170,624.50	\$269,872.00
24,000.00	\$561,650.00	\$607,364.00	\$707,934.80
15,432.00	\$228,290.40	\$396,919.72	\$767,904.23
25,440.00	\$555,493.00	\$1,420,931.20	\$3,324,895.24

14,400.00	\$391,740.00
15,600.00	\$308,132.50
7,200.00	\$142,215.00
360.00	\$7,110.75
1,560.00	\$30,813.25

\$834,323.70	\$1,808,007.84
\$622,837.30	\$1,315,187.86
\$273,342.00	\$561,821.40
\$13,929.35	\$28,930.28
\$72,773.89	\$165,087.30

Community	Current Treatment Technology	Would the criteria apply? Or is there dilution capability?	Design Flow (MGD)	Actual Flow (MGD)	Community Population (Census 2010)	Number of Households (American Community Survey 2005-2009)
Kalispell	BNR (modified Johannesburg); 3.1 to 5.4 MGD; avg. .12 mg/l TP; 10 mg/l TN.	Yes. EOP; Ashley Creek	5.4	3.10	19,927	7,705
Bozeman	some BNR now; 5-stage Barrdenpho; new plant will be BNR (1 mg/l TP; 3 mg/l TN starting in 2011); current 5.8 MGD; increasing to 13.9 mgd	Yes. Also Gallatin TMDL in the works.	13.8	5.80	37,280	14,614
Helena	BNR; 3 mg/l TP; 10 mg/l TN; design capacity of 5.4; current discharge ~3.0 MGD	Yes. WLA set in TMDL based on numeric criteria.	5.4	3.00	28,190	12,337
Butte	Current technology is activated sludge (TN of 18.5 mg/l; TP of 2.11 mg/l); under Order to Construct to membrane BNR; current design is 8.5 MGD; talking about lowering to 6.1 MGD. Sewer Fee based on DEQ estimates. Included in current fee is \$27 million upgrade in new capital costs and \$1.125 million in O&M costs which would bring them to 5 TN and 0.1 TP	Yes. EOP.	8.5	4.00	33,525	14,041
Billings	2ndary treatment; Design flow of 26 MGD (avg.) and 40 MGD max.	Yes. Discharge into the Yellowstone River.	26	26	104,170	41,841
Missoula	advanced secondary treatment facility with biological nutrient removal and ultraviolet disinfection; meets Clark Fork criteria w/ mixing zone. 8.2 mg/l TN; 0.16 -0.4 mg/l TP; get a mixing zone, meeting criteria currently. BNR. Design flow = 12 MGD ; actual flow = 9 MGD. (designed for 10 and 1). (HDR)	Yes. With mixing zone. Currently meeting criteria after mixing zone.	12	9	66,788	27,553
Great Falls	conventional 2ndary activated sludge (max 21-MGD; avg. 10 MGD)	Yes. Missouri River	26	26	58,505	23,998

Livingston	discharges into the Yellowstone; permit renewed in 2010; mechanical plant w/ 2 primary clarifiers, 3 rotating biological contactors, UV, installing co-composting. DMR shows 11 mg/l TN average (20 mg/l for May) and 2 mg/l TP (3 mg/l for May).	Yes. Discharge into the Yellowstone River.	5	2	7,044	3,188
Miles City	2ndary treatment plus oxidation ditch. 2011 permit. Algae plant study to remove nutrients. Extended aeration system w/2 oxidation ditches w/rotating brush aerators; 2 clarifiers and chlorine basin. TN avg of 23.5 mg/l; TP avg. 3.6 mg/l.	Yes. Discharge into the Yellowstone River.	3.7	2	8,410	3,518
Hamilton	BNR facility. t w/ extended aeration system. Oxidation ditch w/ rotating brush aerators. 3 clarifiers. Upgraded in 2010. TN avg. 5.5 mg/l; TP avg. 5 mg/l.	Yes	1.98	0.68	4,348	2,092
Lewistown	BNR plant. Focus on TP removal. 0.8 mg/l TP; 3-4 mg/l TN.	Yes	2.5	1.5	5,901	2,727
Havre	Discharges into the Milk River. Permit renewed in 2011. Activated sludge facility with effluent chlorination. 2006-2010 data showed avg. TP of 3.4 (TN not required). 2011 DMR showed TN of 19.4 mg/l; Tp of 1.3 mg/l.	Yes	1.8	1.38	9,310	3,709
Columbia Falls	Newer plant. Designed to achieve 8 mg/l TN	Yes	0.766	0.37	4,688	1,621
Manhattan	Discharges into Diva Ditch. Permit renewed in 2010. Denitrification with fixed film suspended growth system, clarifiers and aerobic sludge digestion, UV. DMR data from winter quarter shows 11 mg/l TN and 1 mg/l TP. 2008-2010 showed avg. TN of 14 mg/l TN and 4 mg/l TP.	Yes	0.6	0.4	1,520	523
Lolo	No steps towards nutrient removal. For Lolo, TN is generally less than 30 mg/l and TP less than 7. Generally heaving loadings for Lolo. Sewer rates--Lolo \$30.25-ish/mo - (RSID) based on property values	Yes	0.34	0.38	3,892	1,060

Stevensville	Stevensville is generally a little better with TN generally below 20 and TP less than 4.	Yes	0.3	0.29	1,809	795
Philipsburg	lagoon to simple mechanical system - ref. Gary Swanson, consulting engineer- 15TN, 2TP	Yes.	0.2	0.2	820	399
Cut Bank	Lagoon.	Yes	0.643	0.643	2,869	1,290
Deer Lodge	Moving from an existing lagoon to mechanical plant with land application. Ref: planning document--To get to variance only. Because this would be a land application system, so theoretically, the N and P would be zero to the Clark Fork	Yes	3.3	1.06	3,111	1,522
Glendive	domestic WW lagoon; 3 cell facultative; current O&M costs are <\$; 8-10 capital costs for new plant. O&M increase of ~\$300,000. new avg. 1.15 MGD; PER completed to upgrade to mechanical SBR or BNR plant.	Yes	1.3	0.6	4935	1883
Redlodge	Lagoon.	Yes	1.2	0.65	2125	1055
Big Fork	Lagoon.	Yes	0.5	0.3	4270	1708
Highwood	Lagoon.	Yes	0.026	0.015	176	53
Circle	Lagoon.	Yes	0.16	0.065	615	234

NOTE: Operation costs include energy and chemical costs only and do not include labor and maintenance cost. As such, these numbers are on the low side.

NOTE: The numbers are intended to provide ROUGH ESTIMATES for discussion purposes and do not reflect the site-specific conditions at each plant.

NOTE: Capital costs were assumed to cover a 20-year bond with 7% interest (used 0.0802 conversion factor)

NOTE: MHI is based on data from Montana CEIC based on 2010 estimates.



Indicates rough estimates; need to verify

Big Fork number of household based on population divided by 2.5

Median Household Income (2010) - American Community Survey.	Current average household sewer bill per year (2008 / 2011)	Current average sewer fee as % of MHI	Notes	Capital cost (million dollars) to meet the numeric nutrient criteria (WERF)	Annual Capital cost to meet the numeric nutrient criteria (L4 WERF)	Annual Operations costs to meet the numeric nutrient criteria L4WERF	Annual Capital and Operations cost (\$)
\$39,953.00	\$361.68	0.91%	Sewer rates obtained from City in 2011. Plant ~WERF Level 2.	84.24	\$7,951,660	\$1,782,965	\$9,734,625
\$41,661.00	\$372.00	0.89%	Sewer rates obtained from City in 2011. Plant ~WERF Level 2. Really Level 3 for TN and 1 for TP	215.28	\$20,320,909	\$3,335,870	\$23,656,779
\$47,152.00	\$277.80	0.59%	Sewer rates obtained from City in 2011. Plant ~ WERF Level 1.	102.60	\$9,684,714	\$1,834,950	\$11,519,664
\$37,335.00	\$360.00	0.96%	Sewer Fee based on DEQ estimates. While current monthly fee is \$13.50, the \$27 million upgrade in new capital costs plus \$1.125 million in additional O&M costs which would bring them to 5 TN and 0.1 TP (WERF 3) would raise rates to \$30 per month	118.15	\$11,152,524	\$1,877,200	\$13,029,724
\$45,004.00	\$218.28	0.49%	The numbers for Billings and Great Falls (treatment levels, treatment costs etc.) were obtained from HDR.	312.50	\$44,836,640	\$15,902,900	\$60,739,540
\$34,319.00	\$152.14	0.44%	Sewer rates obtained from city. 2011 values.	88.80	\$8,382,092	\$2,614,050	\$10,996,142
\$40,718.00	\$187.20	0.46%	At WERF 1. The numbers for Billings and Great Falls (population, treatment levels, etc.) were obtained from HDR.	312.50	\$44,836,640	\$15,902,900	\$60,739,540

\$35,689.00	\$600.00	1.68%	Assume WERF Tier 1	95.00	\$8,967,328	\$1,223,300	\$10,190,628
\$37,554.00	\$236.10	0.63%	Assume WERF Tier 1	70.30	\$6,635,823	\$1,223,300	\$7,859,123
\$25,161.00	\$276.00	1.10%	Assume WERF 2 (since TN gets to WERF 3 and TP WERF 1)	24.75	\$3,551,062	\$423,602	\$3,974,664
\$31,729.00	\$387.60	1.22%	Assume WERF 3 based on current treatment levels	18.50	\$3,280,154	\$691,950	\$3,972,104
\$43,577	\$240.00	0.55%	Assumed WERF Level 1 and 5,000 gallons usage. Rate is \$9.15 flat plus \$2.15 per 1,000 gallons	\$34.20	\$3,228,238	\$844,077	\$4,072,315
\$38,750	\$532.20	1.37%	Upgrade to RO	\$10.65	\$1,005,039	\$938,600	\$1,943,639
\$50,729	\$362.40	0.71%	Assumed WERF Level 2. Correct? Paul.	\$9.36	\$883,518	\$92,024	\$975,542
\$46,442	\$363.00	0.78%	Level 1.	\$6.46	\$609,778	\$232,427	\$842,205

\$33,776	\$535.08	1.58%		\$3.75	\$353,973	\$125,512	\$479,485
\$31,375.00	\$200.00	0.64%	Assume WERF 1	\$19.00	\$ 1,793,465.59	561,650.00	\$2,355,115.59
\$44,833	\$138.48	0.31%	4000 gallons. Base rate \$9.48 at 3000 gallons plus \$2.06 for next 1,000 gallons	\$14.02	\$ 1,323,143.40	228,290.40	\$1,551,433.80
\$40,320	\$409.56	1.02%	Moving from an existing lagoon to mechanical plant with land application. Ref: planning document--To get to variance only. Because this would be a land application system, so theoretically, the N and P would be zero to the Clark Fork	\$71.94	\$1,484,282.75	\$555,493.00	\$2,039,775.75
\$42,821	\$213.96	0.50%		\$36.79	\$3,472,715.74	\$391,740.00	\$3,864,455.74
\$50,123	305.28	0.61%	Sewer Fee and MHI based on DEQ estimates. DEQ MHI value less than the 2010 USDA county data.	\$26.16	\$2,469,318.94	\$308,132.50	\$2,777,451.44
\$44,398	580.36	1.31%		\$10.90	\$1,028,882.89	\$142,215.00	\$1,171,097.89
\$62,614	600.00	0.96%		\$0.57	\$53,501.91	\$7,110.75	\$60,612.66
\$29,000	259.56	0.90%		\$3.49	\$329,242.52	\$30,813.25	\$360,055.77

Annual Additional Cost per Household (increase in sewer rate)	Predicted average household sewer fee to meet criteria	Scenario C	Scenario D	Scenario E	Percent increase in Wastewater bill
\$1,263	\$1,625	4.07	5.31	4.45	349%
\$1,619	\$1,991	4.78	6.38	5.28	435%
\$934	\$1,212	2.57	3.37	2.82	336%
\$928	\$1,288	3.45	4.47	3.77	258%
\$1,452	\$1,670	3.71	4.85	4.07	665%
\$399	\$551	1.61	2.03	1.74	262%
\$2,531	\$2,718	6.68	8.88	7.36	1352%

\$3,197	\$3,797	10.64	14.42	11.82	533%
\$2,234	\$2,470	6.58	8.99	7.33	946%
\$1,900	\$2,176	8.65	11.89	9.66	688%
\$1,457	\$1,844	5.81	7.63	6.38	376%
\$1,098	\$1,338	3.07	4.03	3.37	457%
\$1,199	\$1,731	4.47	5.24	4.71	225%
\$1,865	\$2,228	4.39	5.99	4.89	515%
\$795	\$1,158	2.49	3.09	2.68	219%

265-6719 - City Office

\$603	\$1,138	3.37	4.00	3.57	113%
\$5,902.55	\$6,103	19.45	26.33	21.60	2951%
\$1,202.66	\$1,341	2.99	4.09	3.33	868%
\$1,340.19	\$1,750	4.34			327%
\$2,052.29	\$2,266	5.29	7.36	5.94	959%
\$2,632.66	\$2,938	5.86	8.10	6.56	862%
\$685.65	\$1,266	2.85	3.50	3.06	118%
\$1,143.64	\$1,744	2.78	3.56	3.03	191%
\$1,538.70	\$1,798	6.20	8.53	6.93	593%

WERF

Level	Description	Capital Cost (\$/gpd)	Operations (\$1/ MG/day Treated)
Level 1	No N and P removal	9.3	250
Level 2	1 mg/l TP; 8 mg/l TN	12.7	350
Level 3	0.1-0.3 mg/l TP; 4-8 mg/l TN	14.4	640
Level 4	<0.1 mg/l TP; 3 mg/l TN	15.3	880
100% RO	<0.01 mg/l TP; 1 mg/l TN	28.3	1860

Costs to Meet Criteria	Capital Cost(\$million/MGD)	Design Flow	Facility Upgrade Capital Costs (\$million)	Annualized Capital Costs (Assumed 20-yr bond & 5% interest; \$million/year)
Kalispell	15.6	5.4	\$84.24	\$7.95
Bozeman	15.6	13.8	\$215.28	\$20.32
Helena	19	5.4	\$102.60	\$9.68
Butte	13.9	8.5	\$118.15	\$11.15
Billings	19	25	\$475.00	\$44.84
Missoula	7.4	12	\$88.80	\$8.38
Great Falls	19	25	\$475.00	\$44.84
Livingston	19	5	\$95.00	\$8.97
Miles City	19	3.7	\$70.30	\$6.64
Hamilton	19	1.98	\$37.62	\$3.55
Lewistown	13.9	2.5	\$34.75	\$3.28
Havre	19	1.8	\$34.20	\$3.23
Columbia Falls	13.9	0.766	\$10.65	\$1.01
Manhattan	15.6	0.6	\$9.36	\$0.88
Lolo	19	0.34	\$6.46	\$0.61
Stephensville	12.5	0.3	\$3.75	\$0.35
Philipsburg	19	1	\$19.00	\$1.79
Cut Bank	21.8	0.643	\$14.02	\$1.32
Deer Lodge	21.8	3.3	\$71.94	\$6.79

Glendive	28.3	1.3	\$36.79	\$3.47
Red Lodge	21.8	1.2	\$26.16	\$2.47
Big Fork	21.8	0.5	\$10.90	\$1.03
Highwood	21.8	0.026	\$0.57	\$0.05
Circle	21.8	0.16	\$3.49	\$0.33

Annualization Factor

0.09439

20 years, 5% rate	0.08024
20 years, 7% rate	0.09439

Annualized Capital Costs (Assumed 20-yr bond & 5% interest; \$million/year)	Annualized Capital Costs + UNFUNDED projects (Assumed 20-yr bond & 5% interest; \$million/year)	Operations (\$1/ MG/day Treated)	Operations Costs (\$/ year/ 1 MGD)	Actual Flow	Facility Upgrade Operations Costs (annual) based on Facility MGD
\$7,951,660.06	\$10,375,309.72	1510	551,150.00	3.10	1,708,565.00
\$20,320,909.05	\$31,855,304.53	1510	551,150.00	5.80	3,196,670.00
\$9,684,714.18	\$10,927,554.50	1610	587,650.00	3.00	1,762,950.00
\$11,152,524.18	\$11,638,918.27	1220	445,300.00	4.00	1,781,200.00
\$44,836,639.73	\$48,841,356.83	1610	587,650.00	26.00	15,278,900.00
\$8,382,091.81	\$10,075,210.54	1220	445,300.00	9.00	4,007,700.00
\$44,836,639.73	\$46,589,712.22	1610	587,650.00	26	15,278,900.00
\$8,967,327.95	\$9,910,905.97	1610	587,650.00	2.00	1,175,300.00
\$6,635,822.68	\$6,635,822.68	1610	587,650.00	2.00	1,175,300.00
\$3,551,061.87	\$4,181,512.50	1610	587,650.00	0.68	399,602.00
\$3,280,154.17	\$3,979,918.76	1220	445,300.00	1.50	667,950.00
\$3,228,238.06	\$3,794,279.21	1610	587,650.00	1.38	810,957.00
\$1,005,039.24	\$1,195,182.27	1220	445,300.00	2.00	890,600.00
\$883,517.78	\$1,127,401.92	1510	551,150.00	0.16	88,184.00
\$609,778.30	\$1,642,929.45	1610	587,650.00	0.38	223,307.00
\$353,973.47	\$597,857.61	1120	408,800.00	0.29	118,552.00
\$1,793,465.59	\$1,793,465.59	1610	587,650.00	1.00	587,650.00
\$1,323,143.40	\$1,387,440.84	1120	408,800.00	0.64	262,858.40
\$6,790,627.08	\$7,413,300.87	1370	500,050.00	1.06	530,053.00

\$3,472,715.74	\$3,634,574.69	1860	628,900.00	0.6	377,340.00
\$2,469,318.94	\$2,469,318.94	1370	450,050.00	0.65	292,532.50
\$1,028,882.89	\$1,028,882.89	1370	450,050.00	0.30	135,015.00
\$53,501.91	\$53,501.91	1370	450,050.00	0.015	6,750.75
\$329,242.52	\$517,855.35	1370	450,050.00	0.065	29,253.25

Membrane Replacement Cost (\$24,000 /yr/1 MGD)* Actual Flow	Total Operations costs including membrane replacement	Total Operations costs including membrane replacement + Labor Low (15%)	Total Operations costs including membrane replacement + Labor Hi (48%)
74,400.00	1,782,965.00	\$2,975,714.01	\$5,599,761.83
139,200.00	3,335,870.00	\$6,384,006.36	\$13,089,906.35
72,000.00	1,834,950.00	\$3,287,657.13	\$6,483,612.81
96,000.00	1,877,200.00	\$3,550,078.63	\$7,230,411.60
624,000.00	15,902,900.00	\$22,628,395.96	\$37,424,487.07
216,000.00	2,614,050.00	\$3,871,363.77	\$6,637,454.07
624,000.00	\$15,902,900.00	\$22,628,395.96	\$37,424,487.07
48,000.00	\$1,223,300.00	\$2,568,399.19	\$5,527,617.41
48,000.00	\$1,223,300.00	\$2,218,673.40	\$4,408,494.89
24,000.00	423,602.00	\$956,261.28	\$2,128,111.70
24,000.00	691,950.00	\$1,183,973.13	\$2,266,424.00
33,120.00	\$844,077.00	\$1,328,312.71	\$2,393,631.27
48,000.00	\$938,600.00	\$1,089,355.89	\$1,421,018.83
3,840.00	\$92,024.00	\$224,551.67	\$516,112.54
9,120.00	\$232,427.00	\$323,893.75	\$525,120.58
6,960.00	\$125,512.00	\$178,608.02	\$295,419.27
24,000.00	\$561,650.00	\$830,669.84	\$1,422,513.48
15,432.00	\$228,290.40	\$426,761.91	\$863,399.23
25,440.00	\$555,493.00	\$1,574,087.06	\$3,814,994.00

14,400.00	\$391,740.00	\$912,647.36	\$2,058,643.55
15,600.00	\$308,132.50	\$678,530.34	\$1,493,405.59
7,200.00	\$142,215.00	\$296,547.43	\$636,078.79
360.00	\$7,110.75	\$15,136.04	\$32,791.67
1,560.00	\$30,813.25	\$80,199.63	\$188,849.66

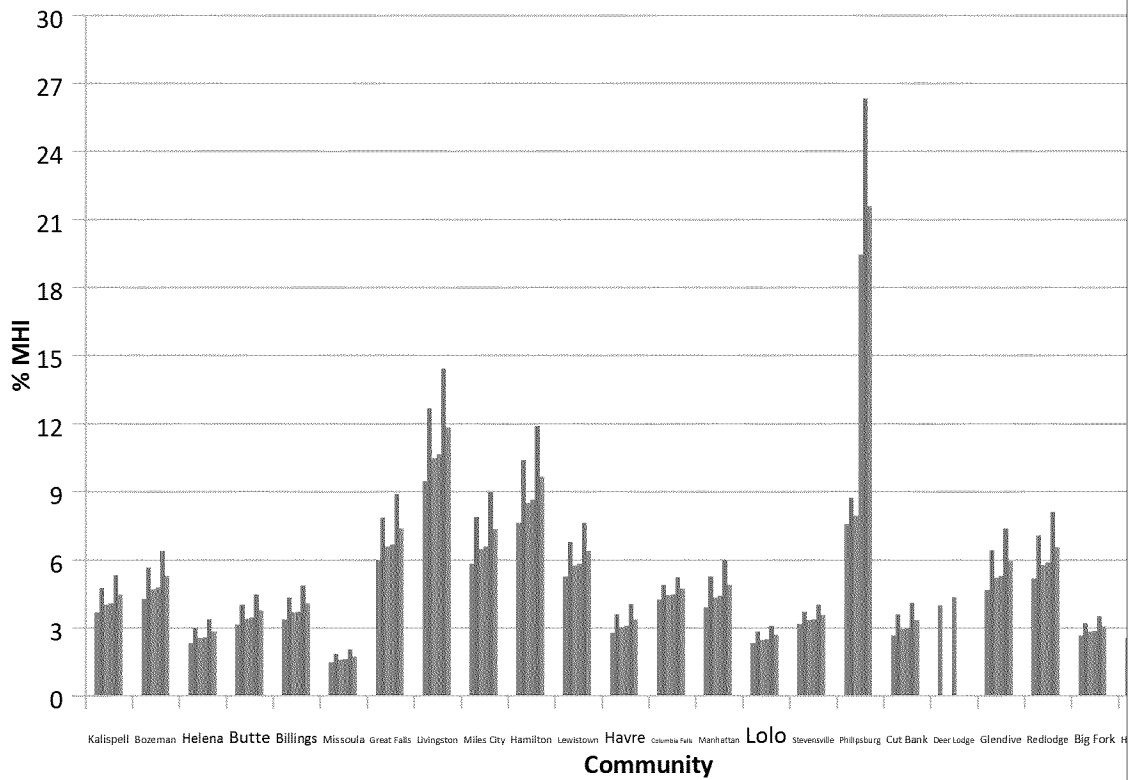
	7%CWNS	Labor low	Labor High	
Original	0	0	0	0
Scenario A	0	0	0	1
Scenario B	0	0	1	0
Scenario C	1	0	0	0
Scenario D	1	0	0	1
Scenario E	1	0	1	0

Community	Original	Scenario A	Scenario B	Scenario C	Scenario D	Scenario E
Kalispell	3.68	4.73	4.01	4.07	5.31	4.45
Bozeman	4.28	5.64	4.70	4.78	6.38	5.28
Helena	2.32	3.00	2.53	2.57	3.37	2.82
Butte	3.13	4.00	3.40	3.45	4.47	3.77
Billings	3.35	4.32	3.66	3.71	4.85	4.07
Missoula	1.47	1.83	1.59	1.61	2.03	1.74
Great Falls	5.99	7.86	6.57	6.68	8.88	7.36
Livingston	9.45	12.67	10.46	10.64	14.42	11.82
Miles City	5.82	7.87	6.46	6.58	8.99	7.33
Hamilton	7.63	10.39	8.49	8.65	11.89	9.66
Lewistown	5.24	6.79	5.73	5.81	7.63	6.38
Havre	2.77	3.58	3.02	3.07	4.03	3.37
Columbia Falls	4.23	4.88	4.43	4.47	5.24	4.71
Manhattan	3.89	5.25	4.32	4.39	5.99	4.89
Lolo	2.31	2.81	2.46	2.49	3.09	2.68
Stevensville	3.17	3.71	3.34	3.37	4.00	3.57
Philipsburg	7.56	8.73	7.92	19.45	26.33	21.60
Cut Bank	2.65	3.58	2.94	2.99	4.09	3.33
Deer Lodge	3.98			4.34		
Glendive	4.64	6.40	5.19	5.29	7.36	5.94
Redlodge	5.16	7.06	5.75	5.86	8.10	6.56
Big Fork	2.65	3.20	2.82	2.85	3.50	3.06
Highwood	2.54	3.20	2.75	2.78	3.56	3.03
Circle	5.47	7.45	6.09	6.20	8.53	6.93

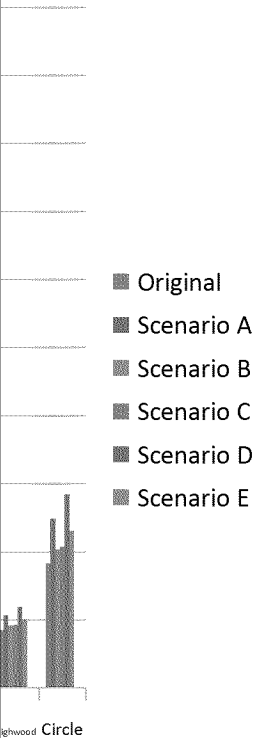
NOTE: Capital costs were assumed to cover a 20-year bond with 5% interest (used 0.0802 conversion factor)

NOTE: MHI is based on data from Montana CEIC based on 2010 estimates.

Figure 1. Expected % MHI to Meet Base Numeric Nutrient Criteria (plus current wastewater w/o CWNS)



fees) - All Scenarios



Community	Original	Min (excludes original)	Average	Max (excludes original)	Median
Kalispell	3.68	4.01	4.37	5.31	4.26
Bozeman	4.28	4.70	5.18	6.38	5.03
Helena	2.32	2.53	2.77	3.37	2.69
Butte	3.13	3.40	3.70	4.47	3.61
Billings	3.35	3.66	3.99	4.85	3.89
Missoula	1.47	1.59	1.71	2.03	1.67
Great Falls	5.99	6.57	7.22	8.88	7.02
Livingston	9.45	10.46	11.58	14.42	11.23
Miles City	5.82	6.46	7.18	8.99	6.95
Hamilton	7.63	8.49	9.45	11.89	9.15
Lewistown	5.24	5.73	6.26	7.63	6.10
Havre	2.77	3.02	3.31	4.03	3.22
Columbia Falls	4.23	4.43	4.66	5.24	4.59
Manhattan	3.89	4.32	4.79	5.99	4.64
Lolo	2.31	2.46	2.64	3.09	2.59
Stevensville	3.17	3.34	3.53	4.00	3.47
Philipsburg	7.56	7.92	15.26	26.33	14.09
Cut Bank	2.65	2.94	3.26	4.09	3.16
Deer Lodge	3.98	4.34	4.16	4.34	4.16
Glendive	4.64	5.19	5.81	7.36	5.62
Redlodge	5.16	5.75	6.42	8.10	6.21
Big Fork	2.65	2.82	3.01	3.50	2.95
Highwood	2.54	2.75	2.98	3.56	2.91
Circle	5.47	6.09	6.78	8.53	6.56

NOTE: Capital costs were assumed to cover a 20-year bond with 5% interest (used 0.0802 conversion factor)

NOTE: MHI is based on data from Montana CEIC based on 2010 estimates.

Community	Original MT Estimate	Original MT Estimate with		Average (irMin (excludes Original	
		100% RO			
Kalispell	2.58	3.68	4.37	4.01	
Bozeman	2.92	4.28	5.18	4.70	
Helena	1.74	2.32	2.77	2.53	
Butte	2.15	3.13	3.70	3.40	
Billings	2.41	3.35	3.99	3.66	
Missoula	1.47	1.47	1.71	1.59	
Great Falls	4.18	5.99	7.22	6.57	
Livingston	6.85	9.45	11.58	10.46	
Miles City	4.09	5.82	7.18	6.46	
Hamilton	5.44	7.63	9.45	8.49	
Lewistown	3.42	5.24	6.26	5.73	
Havre	2.04	2.77	3.31	3.02	
Columbia Falls	3.02	4.23	4.66	4.43	
Manhattan	2.60	3.89	4.79	4.32	
Lolo	1.81	2.31	2.64	2.46	
Stevensville	3.17	3.17	3.53	3.34	
Philipsburg	4.19	7.56	15.26	7.92	
Cut Bank	2.68	2.65	3.26	2.94	
Deer Lodge	3.98	3.98		4.34	
Glendive	3.67	4.64	5.81	5.19	
Redlodge	5.16	5.16	6.42	5.75	
Big Fork	2.65	2.65	3.01	2.82	
Highwood	2.54	2.54	2.98	2.75	
Circle	5.47	5.47	6.78	6.09	

NOTE: Capital costs were assumed to cover a 20-year bond with 5% interest (used 0.0802 conversion factor)

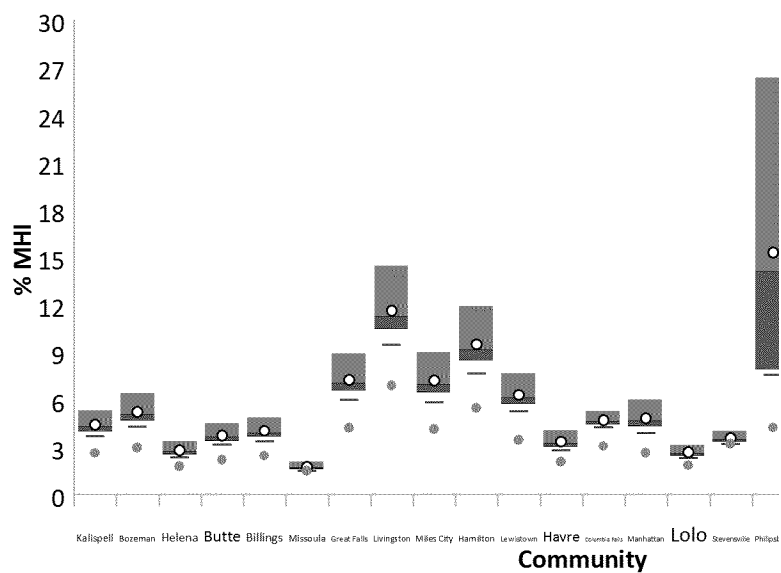
NOTE: MHI is based on data from Montana CEIC based on 2010 estimates.

Estimate)

Max (excludes OrigirMedian (includes Original MT Estimate)

1.05	0.25
1.35	0.33
0.67	0.16
0.86	0.21
0.96	0.23
0.36	0.09
1.86	0.45
3.19	0.77
2.03	0.49
2.73	0.66
1.54	0.37
0.81	0.20
0.65	0.16
1.35	0.33
0.50	0.12
0.53	0.13
12.24	6.17
0.93	0.22
0.01	
1.74	0.42
1.89	0.46
0.55	0.13
0.65	0.16
1.96	0.48

**Figure 2. Expected % MHI to Meet Base Numeric Nutrient Criteria (pl
Presenation**



us current wastewater fees) - Condensed

